**Micro Case 69 – *Clostrdium perfringens* (gas gangrene)**

**1. Signs and symptoms for the disease it produces.**

* This pt had just undergone bowel surgery
* Experienced **severe pain at surgical wound site**
* **Edema** and **tenderness** of wound with **thin, brownish discharge**
* **Discoloration of skin** and **hemorrhagic bullae** at wound site
* **Serosanguineous (containing both blood and serous fluid) discharge**
* Affected muscles showed **failure to bleed**
* **Extensive gas in soft tissues**

**2. The source of infectious organism.**

*Clostridium perfringens*

**3. The manner of exposure, route of infection, tissues that they reside and, where appropriate, transmission to others.**

* *Clostridium* species are part of normal human flora
  + Vegetative cells found in colon
* Cause disease when leave normal niche
* Most infections caused by a mix of bacteria (aerobic and anaerobic)
* Under the right conditions, can invade and multiply in essentially any tissue
* Any host abnormality that causes **vascular stasis** elevates risk for anaerobic infection
* **Carcinoma, diabetes mellitus**, colonic obstruction, treatment w/ immunosuppressive agents, and chemotherapy are **predisposing factors for anaerobic infection**
* **Exogenous infection caused via soil contamination of a deep wound from trauma**

**4. The pathology and the manner by which the particular disease develops and/or is induced, including damage caused by the pathogen and damage caused by the immune system’s response to the pathogen.**

* Bowel surgery allows anaerobes and facultative anaerobes from the colon access to tissues
* Facultative anaerobes assist primary anaerobes to proliferate
* **Clostridial α-toxin is cytolytic owing to activity of phospholipase C activity on cell membranes**
* Other catabolic enzymes yield gas in tissues, producing crepitance
* Systemically, patient develops fever, sweating, and low blood pressure
* Muscle grows black and gangrenous

**5. Methods of identification and placement into a particular biological subset.**

* **Gram stain**
* **Culture** of pus or wound aspirate
* **Aerobic culture**
* **Anaerobic cultures**

*C perfringens* is a **large, box-shaped Gram-positive rod** that is **anaerobic** and **spore forming.** They are catalase negative, so only grow in deep tissues of the body with low redox potential. **Won’t grow on solid media in 10% CO2 in air.** On blood agar, will show **double zone of β-hemolysis**.

**6. Factors leading to enhanced resistance or susceptibility (e.g., recipients of vaccines, residence in geographic areas, types of work, immunodeficiency, alcoholism, age, violence/abuse, religious beliefs, etc.).**

* Bowel surgery
* Any host abnormality that causes **vascular stasis** elevates risk for anaerobic infection
* **Carcinoma, diabetes mellitus**, colonic obstruction, treatment w/ immunosuppressive agents, and chemotherapy are **predisposing factors for anaerobic infection**

**7. Other organisms in the differential diagnosis and how to discriminate among potential causative agents.**

* Anaerobic infection
* Gram-negative bacterial infection
* Mixed infection
* *Staph aureus*
* *Strep pyogenes*

Foul odor of lesion or drainage, gas or discoloration in tissues, and tissue necrosis, gangrene, or abscess point toward a narrowed diagnosis. Gas gangrene is commonly caused by clostridial species, but Gram-negative bacteria (which are much more common in surgical infections) can also cause gas in mixed infections of soft tissue. Gram-positive organisms like *Staph* and *Strep* also commonly cause postsurgical infections, but usually not gas gangrene.

**8. Prevention, treatment and vaccine design (live vs. dead).**

**Surgical drainage** and **debridement** are essential to control the infection initially. Penicillin is DOC in **antibiotic therapy.**

No vaccine. Gas gangrene best prevented by immediate and thorough irrigation and debridement of traumatic wounds and appropriate antibiotic prophylaxis before surgery. ABX used should target anaerobes as well as enteric Gram-negative bacteria.